REMARKS

Claims 1-41 are pending in the present application. In the Office Action dated September 10, 2003, the Examiner rejected claims 1, 2, 4, 5, 14, 15, 17 and 22 under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 5,503,559, to Vari ("Vari"). The Examiner also rejected claims 1, 2, 4, 14, 15, 17, 22-25, 28-32, and 35 under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 5,326,263, to Weissman ("Weissman"). Claims 25, 28, 32 and 35 are also rejected under 35 U.S.C. § 102(b) as anticipated by U.S. Patent No. 5,284,443, to Weil ("Weil"). Claims 3, 5, 16, 27 and 36 are rejected under 35 U.S.C. § 103(a) as unpatentable over the Weissman reference alone. Claims 6-8 and 18 are rejected under 35 U.S.C. § 103(a) as unpatentable over the Weissman reference in view of WO 98/11842, to Billet et al. ("Billet"). The Examiner has also rejected claims 27, 29 and 36 under 35 U.S.C. § 103(a) as unpatentable over the Weil reference alone. Finally, claims 12, 20 and 34 are rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter that the applicant regards as his invention. The Examiner has objected to 9-11, 13, 21, 26 and 33 as being dependent on a rejected base claim, but has indicated that they would be allowable if rewritten in independent form including all of the limitations in the base claim and any intervening claims. Finally, the Examiner has indicated that claims 37-41 are allowed.

The Examiner is thanked for his indication of allowable subject matter in the present application. Applicant nevertheless disagrees with the stated grounds of rejection and desires to further clarify various distinctions of applicant's invention over the cited art. Reconsideration of the present application is therefore requested in light of the present amendment and following remarks.

The disclosed embodiments of the invention will now be discussed in comparison to the prior art. It is understood, however, that the discussion of the disclosed embodiments, as well as the discussion of the differences between the disclosed embodiments of the present invention and the prior art do not define the scope or interpretation of any of the claims. Instead, such discussed differences, when presented, are offered merely to help the Examiner appreciate important claim distinctions as they are discussed.

The various embodiments of the present invention are directed to an apparatus and a method for obturating a canal in a tooth. In one embodiment of the invention, a plug is disclosed that is comprised of a biologically-implantable material and is configured to be implanted into a canal of a tooth to seal the root canal. Accordingly, the plug is suitably

proportioned to fill the root canal in the tooth and to form the desired seal at the apical portion of the root canal. The plug is further optically transmissive, so that light may be projected through the plug so that the plug may be bonded to the walls of the canal by a light-activated sealing agent.

In another embodiment of the invention, a carrier is disclosed having an optically transparent or translucent plug portion that is mounted on a support. The support allows the plug portion to be manually manipulated so that the plug is properly positioned within the canal of the tooth. After the plug portion is properly positioned within the canal, the support may be severed from the plug portion so that the plug portion is implanted in the canal. The support may also include a handle that is mounted on the support portion to assist a user to properly position the plug portion of the carrier in the canal. The plug portion is also suitably proportioned to fill the root canal, and comprised of a material in a fully polymerized state, yet retains sufficient flexibility to permit insertion of the plug portion into the canal. After the support is severed from the plug portion, the plug portion may be illuminated by a light source to set the light-activated sealing agent, thus sealing the walls and the apical tip of the root canal to complete the implantation process

In still another disclosed embodiment, a carrier includes an optical fiber that extends along a support and into a plug portion. The carrier may be coupled to a light source so that light may be transferred from the source to the plug portion through the support in order to set a light-activated sealing agent. As in the previous embodiments, the plug portion of the carrier is comprised of a material having sufficient flexibility to be readily inserted into the canal so that the implantation of the plug into the root canal of the tooth may be accomplished.

The Examiner has cited the Vari reference. Vari discloses an endodontic system that determines a structure of the tooth by induced fluorescence spectroscopy (col. 5, lines 1-5) . Accordingly, the system includes an optical fiber that is coupled to a light source so that ultraviolet or blue excitation light may be directed into the canal to illuminate the interior portions of the canal and to induce the illuminated tissues to fluoresce. The optical fiber also collects light returning from the fluorescing tissues. An optical sensor coupled to the optical fiber receives the collected light and generates electrical signals that correspond to the intensity of the collected light within predetermined wavelength bands. The electrical signals thus generated are then communicated to a processor that determines the composition and the structure of the tissues within the root canal (col. 5, lines 12-27).

In other embodiments, Vari discloses that the optical fiber may be incorporated into other well-known endodontic instruments. As shown in Figure 15, the optical fiber may incorporated into a reamer that is used to shape and clean interior portions of the root canal. Figure 16 shows a file that is used to shape a root canal that also includes a optical fiber that extends along a length of the file. Figure 17 shows a root canal exploration tool that is used to locate the entrance of the root canal. As in the previous embodiments, an optical fiber is positioned within a length of the tool. Figure 20 shows an apex locator that is used to locate the apex of the root canal. In a particular embodiment, the apex locator may be a single optical fiber that extends to the apex of the root (col. 9, lines 58-62).

The applicant therefore understands the Vari reference to disclose an endodontic apparatus that is configured to illuminate an interior portion of an endodontically prepared tooth in order to induce fluorescence in the tissues that comprise the tooth. Vari does not disclose or fairly suggest a plug for an endodontic procedure that is implanted in a root canal to seal the root canal. In particular, Vari does not disclose that the apparatus seals the apical tip of the root canal.

The Examiner has further cited the Weissman reference. Weissman discloses a resilient endodontic post for insertion into a root canal. The post is configured to be inserted into a prepared canal and also may be formed from an optically transmissible material (col. 2, lines 15-17). The post is generally coated with a curable composite sealant material to seal the walls of the canal and to secure the post into the canal space (col. 2, lines 26-29). The post may be used to strengthen a tooth that has been subjected to a traumatic injury, and further allows the later removal of the plastic post so that it may be replaced by a metal post suitable for anchoring a crown, or other similar restorative devices (col. 2, lines 44-50). Although the sealant is used to seal the walls of the root canal, it is not relied upon to seal the apical portion of the tooth. Instead, gutta percha, a well-known endodontic material, is used to seal the apical portion (col. 6, lines 8-9). Further, as pointed out in the reference, the use of gutta percha to seal the apical portion of the root canal affords distinct advantages. For example, the need to drill through a hard cured, hard composite material during retreatment is eliminated (col. 7, lines 3-12).

Weissman therefore discloses an endodontic post that, in combination with the disclosed sealant, purports to seal the wall portions of the root canal. Applicant notes, however, that the apical portion of the root canal is still sealed in the conventional manner using gutta-percha condensation. Weissman does not disclose or fairly suggest a plug for an endodontic procedure that is implanted in a root canal to seal the root canal in the tooth, wherein

the plug also effectively seals the apical portion of the root canal. In fact, Weissman specifically *teaches away* from sealing the apical portion of the root canal with a plug by disclosing the preferred use of gutta-percha in the apical tip to assist in retreatment of the canal.

The Examiner also cites the Weil reference. Weil discloses an endodontic apparatus and method wherein a mandrel having a threaded portion is positioned in a prepared root canal. A volume of an adhesive material is then deposited in the space between the mandrel and the root canal wall and cured. The mandrel is then removed by rotating the mandrel to unthread the mandrel from the threads formed in the cured adhesive material (col. 5, lines 27-45). The threads thus formed are then used to engage corresponding threads on a restorative post (col. 6, lines 7-15) that may be used to anchor a crown (col. 6, lines 24-26). Weil discloses that the mandrel may be formed from a light-transmitting medium (col. 5, lines 47-49) in order to illuminate a light-cured adhesive placed in the root canal. Weil teaches, however, that the root canal is subjected to a conventional root canal procedure prior to forming the cured adhesive structure (the "sleeve") within the root canal (col. 4, lines 46-52 With reference in particular to Figures 1-4 and Figures 8-10, applicant notes that the apical portion of the root canal is sealed by gutta-percha in the conventional manner.

Accordingly, Weil does not disclose or fairly suggest a transparent or translucent plug that is implanted in a root canal to seal the root canal in the tooth. Instead, Weil discloses a mandrel comprised of a transparent material that is removed from the root canal so that a post may be permanently implanted in the root canal. Weil further fails to disclose or fairly teach that either the post or the mandrel seals the apical portion of the root canal. Instead, Weil teaches that the apical portion of the root canal is sealed by the condensation of gutta-percha in the apical portion of the tooth.

Finally, the Examiner has cited the Billet reference. Billet discloses an insert for filling a dental canal. The disclosed insert is comprised of a semi-rigid and malleable core that is formed from a material in a fully polymerized state, and is coated with one or more first sleeves formed by a paste of a composite material *in a pre-polymerization state* (col. 3, lines 10-13; col. 3, lines 49-53). The one or more sleeves are retained by a sheath, which is made of a composite material *in the pre-polymerization state.* (col. 3 lines 65-66). The applicant therefore understands the reference to teach an insert that includes both polymerized components and non-polymerized components.

Accordingly, applicant asserts that Billet does not disclose or fairly suggest an insert for a root canal that is in a fully polymerized state prior to positioning the insert in the canal.

Turning now to the claims, differences between the claim language and the applied art will be specifically pointed out. Claim 1, as amended, recites in pertinent part, "A plug for implantation into an endodontically prepared root canal of a tooth, comprising...an elongated body comprised of a biologically compatible, resilient material having a distal end and a proximal end and having a length to allow the distal end to be positioned adjacent to an apical portion of the tooth when the body is inserted in the root canal of the tooth, *the body being further suitably proportioned to fill the root canal of the tooth and to seal the apical portion of the root canal when implanted...*" (Emphasis added). As explained more fully above, Vari does not disclose this. Instead, Vari discloses an endodontic system configured to illuminate the tissues in a tooth to fluorescence in order to determine the composition and structure of the tooth. Vari does not disclose or suggest an implantable plug that seals the walls and the apical tip in a root canal. The Weisman reference similarly does not disclose or suggest this. In particular, Weissman does not disclose or suggest that the disclosed post seals the apical tip of the root canal. Accordingly, claim 1 is allowable over the cited references. Claims depending from claim 1 are also allowable over the cited references based upon the allowability of the base claim and further in view of the additional limitations recited in the dependent claims.

Claim 14, as amended, recites in pertinent part, "A carrier for root canal obturation in an endodontically prepared tooth, comprising...an elongated plug portion comprised of a biologically implantable, resilient material having a distal end and a proximal end and having a length to allow the distal end to be positioned adjacent to an apical portion of the tooth when the plug portion is implanted in the root canal of the tooth, *the distal end sealing the apical portion when the plug is implanted...* and...*an elongated support portion having a first end coupled to the proximal end of the plug portion and an opposing second end.*" (Emphasis added). Again, the Vari and Weissman references simply do not disclose or suggest this. In particular, the applied references do not disclose or suggest a support portion. Claim 14 is now allowable over the cited references. Claims depending from claim 14 are also allowable over the cited references based upon the allowability of the base claim and further in view of the additional limitations recited in the dependent claims.

Claim 25, as amended, recites in pertinent part: "A method for obturating a root canal passage in a tooth, comprising...applying a light-curing adhesive to the root canal

passage...implanting an optically transmissive plug into the root canal passage, the plug being in a fully polymerized condition prior to implanting the plug into the root canal passage, *the plug sealing an apical portion of the root canal when implanted...*" (Emphasis added). Weissman does not disclose or suggest this. In particular, Weissman does not disclose or suggest that the disclosed post seals the apical tip of the root canal. Weil also does not disclose or suggest this. Weil. Weil fails to disclose or fairly teach that either the disclosed post or the mandrel seals the apical portion of the root canal. Instead, Weil teaches that the apical portion of the root canal is sealed by the conventional gutta-percha condensation method. Claim 25 is therefore also allowable over the cited references. Claims depending from claim 25 are also allowable over the cited references based upon the allowability of the base claim and further in view of the additional limitations recited in the dependent claims.

Claim 30, as amended, recites in pertinent part: "The method according to claim 25 wherein implanting an optically transmissive plug into the root canal passage further comprises...manipulating a carrier having an optically transmissive plug portion positioned on a support portion *to place the plug portion in proximity to the root canal passage that seals at least an apical portion of the root canal passage...*and ...inserting the plug portion into the root canal passage. (Emphasis added). As described more fully above, Weissman does not disclose or suggest this. Claim 30 is therefore also allowable over the cited references. Claims depending from claim 30 are also allowable over the cited references based upon the allowability of the base claim and further in view of the additional limitations recited in the dependent claims.

With respect to the Examiner's rejections under 35 U.S.C § 112, second paragraph, applicant respectfully disagrees with the Examiner's position that the limitation that the plug is fully polymerized conflicts with the further limitation that the plug may be one component of a two-component bonding system. It is well understood that a selected component may be fully polymerized (*i.e.* a solid material) and still be reactive to a second component. Applicant therefore requests that this rejection be removed.

With respect to the Examiner's rejections under 35 U.S.C. § 103(a), applicant submits that the foregoing amendments address these grounds of rejection also.

In light of the foregoing amendments and remarks, applicant asserts that all claims are in condition for allowance, and that action is respectfully requested. If there are any remaining matters that can be handled in a telephone conference, the Examiner is invited to telephone the undersigned attorney, Steven H. Arterberry, at (206) 903-8787.

Respectfully submitted,

DORSEY & WHITNEY LLP

Steven H. Arterberry
Registration No. 46,314
Telephone No. (206) 903-8787

SHA:tlm

Enclosures:

- Postcard
- Check
- Fee Transmittal Sheet (+ copy)
- Request for Continued Examination (+ copy)

DORSEY & WHITNEY LLP
1420 Fifth Avenue, Suite 3400
Seattle, Washington 98101-4010
(206) 903-8800 (telephone)
(206) 903-8820 (fax)

h:\ip\documents\clients\randal calvert, d.d.s\501059.01\501059.01 amend foa 021004.doc